

WHAT IS CLAIMED IS:

1. Apparatus for producing a sterile milk product comprising:

a primary filter assembly having at least one microfiltration unit, each microfiltration unit having a microfilter with an inlet conduit for supplying a skim milk portion to one side of the microfilter and a permeate outlet conduit on the opposite side of the microfilter, the at least one microfiltration unit having a retentate outlet conduit;

a secondary filter assembly having at least one microfiltration unit, each microfiltration unit having a microfilter with an inlet conduit for supplying a skim milk portion to one side of the microfilter, a permeate outlet conduit on the opposite side of the microfilter, the at least one microfiltration unit having a retentate outlet conduit; and

an interconnecting conduit between the retentate outlet conduit of the primary filter assembly and the inlet conduit of the secondary filter assembly;

whereby the permeate stream from the primary filter assembly has a reduced concentration of bacteria.

2. The apparatus as claimed in claim 1 wherein the primary filter assembly includes a plurality of microfiltration units, the retentate outlet conduit of each unit being connected to the inlet conduit of the adjacent unit in a series relation.

3. The apparatus as claimed in claim 2 wherein the permeate outlet conduit of each unit is arranged to communicate with each other to form a combined stream.

4. The apparatus as claimed in claim 2 wherein the microfilter of each unit has a pore size of about $0.5\ \mu\text{m}$, or less.

5. The apparatus as claimed in claim 2 wherein the microfilter of each unit has a pore size of about $0.3\ \mu\text{m}$, or less.

6. The apparatus as claimed in claim 2 wherein the microfilter of each unit has a pore size of about $0.5\ \mu\text{m}$, or less.

7. The apparatus as claimed in claim 2 wherein the microfilter of each unit has a pore size of about $0.3\ \mu\text{m}$, or less.

8. The apparatus as claimed in claim 1 wherein the secondary filter assembly includes a plurality of microfiltration units, and the microfilter of each unit has a pore size larger than $0.5\ \mu\text{m}$.

9. The apparatus as claimed in claim 1 wherein the secondary filter assembly includes a plurality of microfiltration units, and the microfilter of each unit has a pore size larger than $0.3 \mu\text{m}$.

10. The apparatus as claimed in claim 1 wherein the secondary filter assembly has a plurality of microfiltration units, the permeate outlet conduit of the secondary filter assembly being in communication with the inlet conduit of the primary filter assembly.

11. The apparatus as claimed in claim 3 including heat treatment means for heating the skim milk portion from the permeate outlet conduits of the primary filter assembly.

12. The apparatus as claimed in claim 1, including valve means for selectively closing the interconnecting conduit, and for directing the flow of retentate to a discard location.

13. A process for producing a sterile milk product comprising:

(a) arranging a plurality of microfiltration units in a primary filter assembly, each unit having a microfilter providing a retentate stream and a permeate stream,

(b) supplying a skim milk portion in a stream to the first microfiltration unit in the primary filter assembly;

(c) conducting the retentate stream in series from the first unit to each subsequent unit, and thereby providing a retentate discharge stream from the primary filter assembly;

(d) arranging a plurality of microfiltration units in a secondary filter assembly, each unit having a microfilter providing a retentate stream and a permeate stream;

(e) supplying the retentate discharge stream to the secondary filter assembly;

(f) combining the permeate stream from the respective microfiltration units of the primary filter assembly; and

(g) supplying the permeate stream from the secondary filter assembly to the skim milk portion stream upstream from the primary filter assembly.

14. The process as claimed in claim 13, including separating the skim milk portion from a cream portion, and including supplying the permeate stream from the secondary filter assembly to the cream portion.

15. The process as claimed in claim 13 wherein the microfiltration units of the primary filter assembly have a pore size of about 0.50 μm , or less, and

including subjecting the permeate stream to heat treatment sufficient to kill all remaining bacteria.

16. The process as claimed in claim 13 wherein the microfiltration units of the primary filter assembly have a pore size of about 0.30 μm , or less, and including subjecting the permeate stream to heat treatment sufficient to kill all remaining bacteria.

17. The process as claimed in claim 15 including selectively diverting the retentate discharge stream to a discard location.

18. The process as claimed in claim 15 wherein the heat treatment is carried out at a temperature in the range of about 72°C to 98°C.

19. The process as claimed in claim 16 wherein the heat treatment is carried out in the range of about 72°C to 98°C.

20. The process as claimed in claim 1 including selectively mixing the permeate stream from the secondary filter assembly with raw milk before separating into a cream portion and a skim milk portion.

21. The process as claimed in claim 15 wherein the concentration of microorganisms in the retentate of the first unit is increased by a factor of from less than about 2 to about 10 as compared to the skim milk portion.

22. The process as claimed in claim 15 wherein the concentration of microorganisms in the retentate of the second unit is increased by a factor of from less than about 2 to about 10 as compared to the retentate of the first unit.

23. The process as claimed in claim 15 wherein the concentration of microorganisms in the retentate of the third unit is increased by a factor of from less than about 2 to about 10 as compared to the retentate of the second unit.

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